MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2016/2017

PEM0044 – ESSENTIAL MATHEMATICS
(All sections / Groups)

26 MAY 2017
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **FOUR (4)** printed pages with 4 questions only, excluding the cover page.

2. Answer all **FOUR (4)** questions.

3. Write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

4. The formula sheet is attached at the end of this question paper.

Question 1 (30 Marks)

(a)   Perform the indicated operation and simplify the answer.

$$\frac{m}{m-4}+\frac{2m-1}{4-m}$$

[8 marks]

(b)   Rationalize the denominator.

$$\frac{1}{\sqrt{5}+\sqrt{3}}$$

[6 marks]

(c)   Solve the following inequality.

$$2(4+3x)\geq 10+4(x+1)$$

[5 marks]

(d)   Find an equation of the straight line that passes through point (1, -5) and is perpendicular to the line $2y-4=x$. Next, sketch the graph of the new equation.

[11 marks]

Question 2 (25 Marks)

(a)   Given

$$A=\begin{bmatrix} 3 & 4 \\ -1 & 2 \end{bmatrix} \text{ and } B=\begin{bmatrix} 3 & 2 \\ -1 & 2 \end{bmatrix}.$$

Find the matrix X satisfying the matrix equation $2X+B=3A$.

[7 marks]

(b)   Solve the equation using the inverse of the coefficient matrix:

$$4x+y-4z=17$$
$$2x+y-z=12$$
$$-2x-4y+5z=17$$

(Note : No decimal is allowed in the calculation as well as in the final answer).

[18 marks]

Continued...

Question 3 (20 Marks)

(a)   Given the fourth term of an arithmetic progression is 56 and its tenth term is 140.

    (i)   Find the common difference.

                                                                   [4 marks]

    (ii)   Find the first term.

                                                                     [3 marks]

    (iii)   Find the 8th term.

                                                                     [3 marks]

    (iv)   Find the sum of the first 16 terms.

                                                                     [4 marks]

(b)   Given the geometric progression: 12, 24, 48, 96, ...

    (i)   Find the first term and the common ratio.

                                                                     [3 marks]

    (ii)   Find the 12th term.

                                                                     [3 marks]

Question 4 (25 Marks)

(a)   Find the derivatives of the following functions:

    (i)   Find $\dfrac{dy}{dx}$ if $y = 1 - x^3 e^{-9x}$

                                                                     [5 marks]

    (ii)   Find $f'(x)$ if $f(x) = 6^{\sqrt{x}}$

                                                                     [5 marks]

    (iii)   Find $f'(x)$ if $f(x) = 2xe^{5-2x}$

                                                                     [4 marks]

Continued...

(b)   Evaluate each of the following integrals:

(i) $\int \sqrt[5]{x^3} + \dfrac{t}{x^3} - \dfrac{t^2}{\sqrt{x}} \ dx$

[3 marks]

(ii) $\int_{-2}^{2} \dfrac{1}{x^2} + 2x - \dfrac{x^3}{5} \ dx$

[3 marks]

(iii) $\int \dfrac{4x}{\sqrt{2x^2 + 1}} dx$

[5 marks]

End of Page.

Course: Essential Mathematics
Code: PEM0044

<u>Summary of Formulas</u>

1. Basic Rules of Differentiation

 i) $f'(x) = 0$
 ii) $f'(x) = nx^{n-1}$
 iii) $cf(x) = cf'(x)$
 iv) $f(x) \pm g(x) = f'(x) \pm g'(x)$
 v) $f'(x) = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$
 vi) $f'(x) = \dfrac{v\dfrac{du}{dx} - u\dfrac{dv}{dx}}{[v]^2}$
 vii) Chain rule: $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$
 viii) General power rule: Derive $[f(x)]^n = n[f(x)]^{n-1} f'(x)$

2. Basic Rules of Integration

 i) $\int k \; du = ku + C$
 ii) $\int u^n \, du = \dfrac{u^{n+1}}{n+1} + C$
 iii) $\int k f(u) \; du = k \int f(u) \; du$
 iv) $\int [f(u) \pm g(u)] \; du = \int f(u)du + \int g(u)du$